recovery after chemotherapy, 61% of the apheresis procedures performed after chemotherapy-GF occurred when WBC was <20 compared to 21% of those performed after GF alone ($P < 0.0001$). With GF alone, mobilization is optimal after 4-5 days of therapy when WBC is likely to be ≥20. We conclude that mobilizing patients with the combination of chemotherapy and GF rather than GF alone is likely to lead to leukapheresis being performed when the WBC count is in a range that results in optimum CD34+ cell CE. Autologous stem cells should be mobilized with chemotherapy-GF rather than GF alone if this is clinically feasible.

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A LONG TERM FOLLOW UP STUDY OF AUTOLOGOUS TRANSPLANTATION FOR FOLLICULAR LYMPHOMA: A SINGLE CENTER EXPERIENCE

Ganguly, S., Deauna-Limayo, D., Divine, C.L., Bodensteiner, D.C., Cook, J.D., Lewis, J.L., Skikne, B.S. University of Kansas Medical Center, Kansas City, KS

Appropriate timing of transplant in the management of follicular lymphoma (FL) is not clear. We retrospectively evaluated our experience of autologous transplantation in patients with FL from 1991 to 2003. Seventeen males and 7 females (n = 24) of median age 47.5 years (range, 28-64 years) were treated. Three patients were in first remission. Twenty one patients were salvaged after relapse with second line chemotherapy. Of these, 14 were in CR or very good PR at the time of transplantation, and 7 patients were transplanted with active disease. Bone marrow was used in 6 patients as the source of stem cells prior to 1995 and peripheral blood stem cells were used in 18 patients. The median CD34+ cell dose was 2.97×10^6/kg (range, $2.22\text{-}7.49 \times 10^6$/kg). Twenty-three of 24 patients engrafted (96%). Median time for neutrophil recovery was 11.5 days (range, 9-35 days) and 15 days (range, 10-40 days) for platelets. Median duration of follow up was 6 years (range, 7 month-8 years). Of the 24 patients, 6 had died. One patient died from transplant related pulmonary complication. Overall survival (OS) and disease free survival (DFS) of all evaluable patients were 71.6% and 40%. Median duration of response was 4.3 years. OS and DFS in patients transplanted in CR were 80% and 57%. For those transplanted with disease, a complete response was achieved in 43% of patients, with the OS and DFS of 57% and 19 % respectively. Status at transplantation was not a significant variable for survival ($p > 0.3$). Three patients developed moderate to severe treatment related toxicity; 2 with Grade III mucositis and 1 with life threatening infection. In our experience, high dose therapy with autologous stem cell transplantation in patients with high risk or relapsed/refractory FL has little toxicity and appears to be effective. Those with more advanced disease may require additional approaches to achieve and maintain remission.

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NON-MELPHALAN BASED CONDITIONING REGIMENS FOR TANDEM AUTOGRAFTS IN MULTIPLE MYELOMA PATIENTS

Moreb, J.S., Pumphrey, P., Khan, S.A., Leather, H., Finiewicz, K.J., Reddy, V.S., Wingard, J.R. University of Florida, Gainesville, FL

Autologous stem cell transplantation (ASCT) has become a standard therapy for multiple myeloma (MM) patients. In the current study we evaluated the toxicity and efficacy of tandem autografts for MM patients using non-melphalan based conditioning regimens. Patients with stage II and III MM were enrolled in the study after exhibiting response to induction therapy. The treatment plan was designed to harvest a dose of 10×10^6 peripheral blood CD34+ cells/Kg ideal body weight (IBW) for the planned 2 transplants; however, a 2nd ASCT would be pursued only if CR has not been achieved after the 1st ASCT. The 1st conditioning regimen included Busulfan 0.75 mg/Kg PO q6h for 16 doses on days -8 through -5, Etoposide 10mg/Kg IV on days -4 to -2, and Cyclosphosphamide 60 mg/Kg IV on days -3 and -2. The conditioning regimen for the 2nd ASCT included 96 hour continuous infusion of Cyclophosphamide (6 gr/m^2) followed by total body irradiation of 600 cGy in 4 fractions over 2 days followed by reinfusion of stem cell product. Thus far, 21 patients have been enrolled, median age of 56 years with median of 191 days from diagnosis to 1st ASCT. All patients completed stem cell harvest successfully. Total of 11 patients did not proceed to 2nd ASCT: 7 patients refused 2nd ASCT, 3 patients had CR after 1st ASCT, and 1 patient was disqualified due to drug induced psychosis during 1st ASCT. Two patients are currently undergoing 2nd ASCT. Eight patients completed tandem autografts. Median CD34+ cell dose and engraftment were similar for both transplants. Median time between the 2 ASCTs was 107 days (range 91-145). One patient with history of gastric bypass died due to liver failure 7 months after 2nd ASCT. Another patient who completed one ASCT died due to disease progression (PD) at 806 days after diagnosis. Overall 3 patients had CR and 3 had very good PR (VGPR) after 1st ASCT (29%), while 5 achieved CR and 1 VGPR after 2nd ASCT with total of 9/21 (43%) with CR+VGPR. At the time of data analysis, 5 of 11 patients who completed only one ASCT showed PD at a median time of 306 days, while only 3 of 8 patients completing the 2nd ASCT had PD at a median time of 562 days. In conclusion, tandem autologous transplants result in higher proportion of MM patients achieving CR, and non-melphalan based conditioning regimens seem to be effective and safe, however a large number of patients remain unwilling to proceed to the 2nd ASCT, mainly because of economical/social reasons.

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FILGRASTIM (GCSF) IS BENEFICIAL AFTER AUTOLOGOUS PERIPHERAL BLOOD GRAFTS WITH HIGH CD34$^+$ CELL CONTENT

Boulmay, B.[1], Pazzalia, A.[1], Leather, H.L.[2], Sugrue, M.[2], Wingard, J.R.[1] 1. College of Medicine, University of Florida, Gainesville, FL; 2. Shands at the University of Florida, Gainesville, FL

The 2000 ASCO guidelines recommend the use of colony stimulating factors (CSFs) after autologous peripheral blood stem cell transplantation (aPBSCT); however, the need for CSFs for patients (pts) with adequate CD34$^+$ cell content in their grafts has not been established. Prior to 9/01, we initiated GCSF 5mcg/kg of IBW beginning on D+6 only for pts with CD34$^+$ doses of less than 6×10^6/kg; since 9/01, that threshold was reduced to 4.5×10^6/kg. **Methods:** We conducted a retrospective review of 43 aPBSCT pts from 9/99 through 5/03 with cell doses between $4.5\text{-}6 \times 10^6$/kg, 20 of whom had received GCSF (CSF) and 23 of whom had not (w/o CSF). The groups were matched for age, sex, diagnosis, prior chemotherapies, conditioning regimens, and mobilization regimens. T-test was used to analyze the data. **Results:** CSF pts had significantly earlier ANC engraftment, shorter duration of neutropenia, shorter hospital stays, and fewer days of IV antibiotics, as shown below in Table. A significant difference was not found for median days of fever, 1 in CSF pts vs 2 in pts w/o CSF ($p = 0.31$), or median day of platelet engraftment, 13.5 (range 10-74) vs 17 (range 11-30), $p = 0.29$. Significantly more pts with prior radiation therapy (RT) were in the group w/o CSF than in the CSF group (8 vs 1, p 0.02); however, RT was not found to be a risk factor for delayed engraftment, prolonged neutropenia, or length of stay. **Conclusion:** CSF use in aPBSCT pts with CD34$^+$ cell dose $<6 \times 10^6$/kg results in earlier engraftment, shorter neutropenia, and shorter hospital stay. Based on the average wholesale price of GCSF and the daily cost of hospitalization for aPBSCT pts, the cost of using GCSF in this population is $1500 per patient vs $4400 for 3 extra days of hospital stay. CSFs should therefore be used post-aPBSCT in pts with CD34$^+$ cell dose $<6 \times 10^6$/kg.

Table. *Effect of G-CSF on Time to Engraftment, Time to Discharge, Days of Neutropenia and Days of Antibiotic Therapy*

Parameter	CSF	w/o CSF	*P* Value
Median day to ANC > 100 (range)	11 (8-13)	13 (9-15)	<0.001
Median day to ANC > 500	11 (10-14)	15 (9-20)	<0.001
Median day of discharge	12 (11-18)	15 (12-32)	0.0087
Days of neutropenia	8 (6-15)	12 (8-16)	<0.001
Days of IV antibiotics	6 (0-12)	8 (0-13)	0.03